Engaging Citizen Scientists to Enhance Cloud Information from Satellite Remote Sensing

CERES SCIENCE TEAM MEETING
EARTH RADIATION BUDGET WORKSHOP
OCTOBER18TH-21ST, 2016

EUROPEAN CENTER FOR MEDIUM-RANGE WEATHER FORECASTS (ECMWF)
SHINFIELD PARK, READING, UK

DR. PATRICK TAYLOR
SCIENCE DIRECTORATE

SARAH MCCREA, SARAH.MCCREA@NASA.GOV
SDEPO@LISTS.NASA.GOV

CERES Education and Communication

Science Communications and Education

Education Team

Lin Chambers, Lead, Detailed to Headquarters
Jessica Taylor, On-site Lead
Ann Martin, Evaluator

Focus: CAN Award Education Components

NASA Champion: Lin Chambers
S'COOL/GLOBE Integration
Sarah McCrea
Support: Tina Rogerson

NASA Champion: Jessica Taylor/Lin Chambers/Margaret Pippin
GLOBE at Langley
Tina Harte
Support: Preston Lewis, Sarah McCrea

NASA Champion: Lin Chambers
MY NASA DATA
Team Collaboration
Support: Tina Harte, Jill Teige, Daniel Oostra, Penny Oots

Continuing Mission Related Education Support

CERES
Sarah McCrea

CALIPSO
Jessica Taylor

SAGE III on ISS
Kristyn Damadeo

TEMPO
Margaret Pippin

DISCOVER/KORUS-AQ
Amber Richards
Lin Chambers

** Additional Support from Translators Personnel (Camelia Dellar) and ASDC Personnel*

Communications Team

Denise Lineberry

Aimee Amin
MaryAnn Jackson
Jay Madigan
Tim Marvel

Reminder: New Plan

NASA SD Education mainly funded through the NASA Cooperative Agreement Notice (CAN)

- Missions are no longer required to set aside 1% of funding for mission-specific education efforts
- Cooperative Agreements for **thematic** educational **content** and activities were awarded in late 2015. LaRC CAN Awards include:
  - **NESEC: Interagency Collaborations (NASA Earth Science: JPL, Goddard, Wallops…)**
  - **Mission Earth: Academic Collaborations (Tennessee University, Berkeley, Boston, Toledo, WestEd…)**
- Missions can still set aside funds for communications or fund additional education as needed.
- Full SMD Education awardee list: http://www.nasa.gov/feature/list-of-science-education-partners-for-nasa-stem-agreements

Reminder: New Plan

- **Communications**
  - Earth Right Now
  - Earth Observatory
  - Science Visualization Studio
- **Education**
  - Funded Projects from 2015 CAN Awards (NESEC, Mission Earth)
  - The GLOBE Program
  - MY NASA DATA
  - S'COOL
  - Office of Education Efforts: NIFS, Educator Professional Development, STEM Engagement activities, and Outreach Events

Slide Credit: Jessica Taylor and Dr. Todd Ellis, CALIPSO Science team Meeting 2016

Science Directorate Education Scope

Focus on providing many opportunities to involve educators (formal/informal), reaching students and the citizen science community, in real world science.

The SD EPO Team…

- Collaborates with the education community to bring authentic Earth science practices and real-world data into the classroom.
- Provides Learners with unique NASA experiences, engaging activities, and advanced technology.
- Provides products developed and reviewed by science and education experts.

Our goals include inspiring the next generation of Science, Technology, Engineering and Mathematics (STEM) professionals and improving STEM literacy by providing innovative participation pathways for educators, formal and informal, to reach students and the public.

New Education Priorities

Current Initiatives

- S'COOL - Cloud Resources and Satellite Data Matching
- MYNASADATA – Website and Data Visualization
- GLOBE
  - National/International Partnerships
  - Elementary GLOBE
  - Field Campaigns
  - GLOBE Observer/Citizen Science
- 21CCLC- Collaboration with Department of Education
- TEMPO- Student Collaboration and C/PE
- NASA Earth System Science Award Intel ISEF
- Evaluation
- Agency/Langley/SD Support
- Outreach/Teacher Recruitment

New Communication Priorities

NASA Communications

Agency Communications Priorities

Earth Right Now. *Your planet is changing. We're on it. #EarthRightNow*
NASA's fleet of satellites, its airborne missions and researchers address some of the critical challenges facing our planet today and in the future: climate change, sea level rise, freshwater resources, and extreme weather events.

ISS. *Off the Earth, for the Earth. #ISS*
The International Space Station is a blueprint for global cooperation and scientific advancements, a destination for growing a commercial marketplace in low-Earth orbit, and a test bed for demonstrating new technologies. The space station is the springboard to NASA's next great leap in exploration, including future missions to an asteroid and Mars.

Mars. *Join us on the journey. #JourneytoMars*
We are on a journey to Mars. Today our robotic scientific explorers are blazing the trail. Together, humans and robotics will pioneer the next giant leap in exploration.

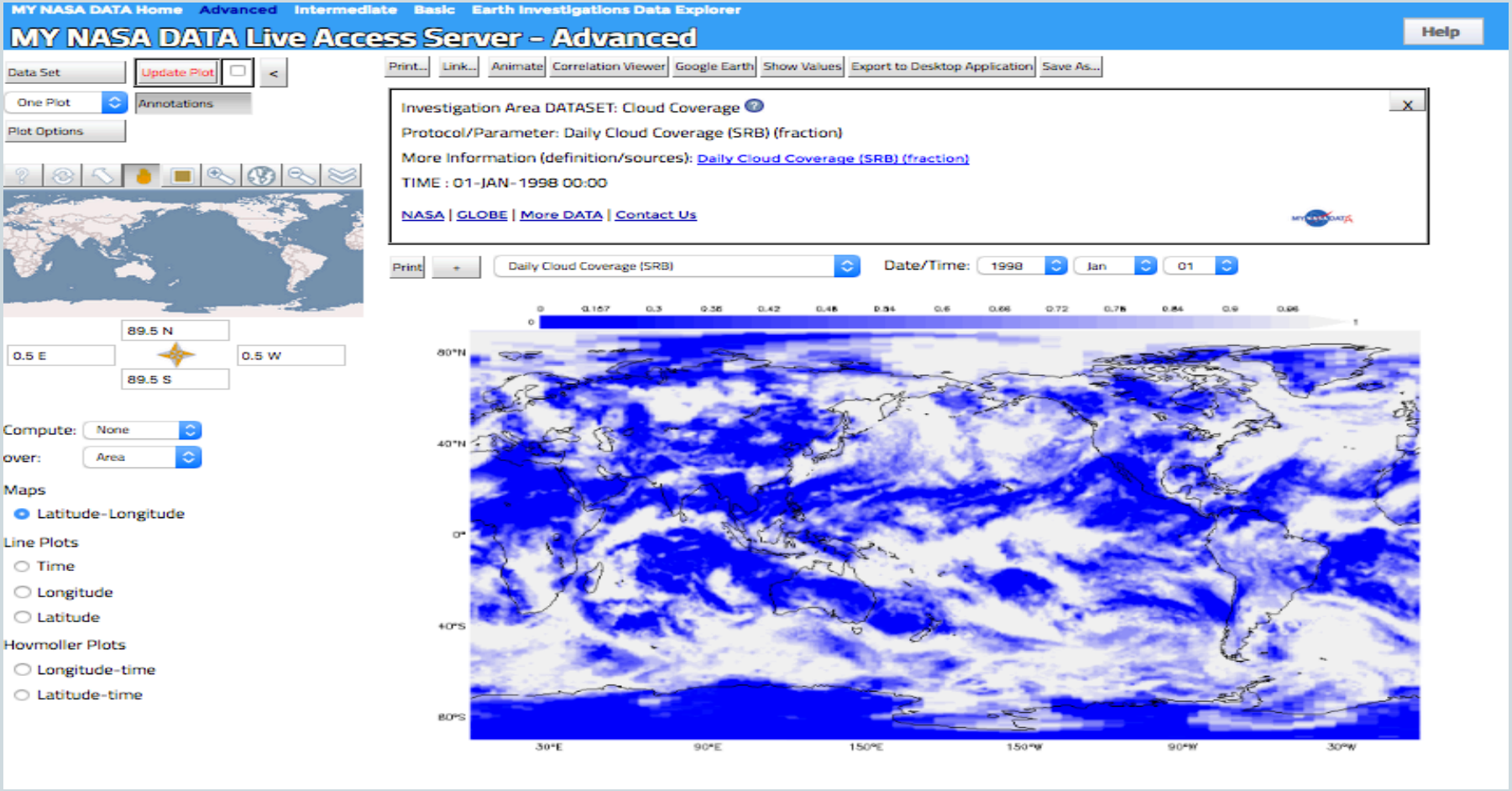
Technology. *Technology drives exploration. #NASATech*
We develop, test and fly transformative capabilities and cutting edge exploration technologies. Our technology development provides the onramp for new ideas, maturing them from early stage through flight and giving wings to the innovation economy.

Aeronautics. *NASA is with you when you fly. #FlyNASA*
Every U.S. aircraft and air traffic control tower uses NASA-developed technology. We're committed to transforming aviation by reducing its environmental impact, maintaining safety, and revolutionizing aircraft shapes and propulsion.

Solar System and Beyond. *NASA: We're Out There. #NASABeyond*
NASA's exploration spans the universe. Observing the sun and its effects on Earth. Delving deep into our solar system. Looking beyond to worlds around other stars. Probing the mysterious structures and origins of our universe. Everywhere imaginable, NASA is out there.

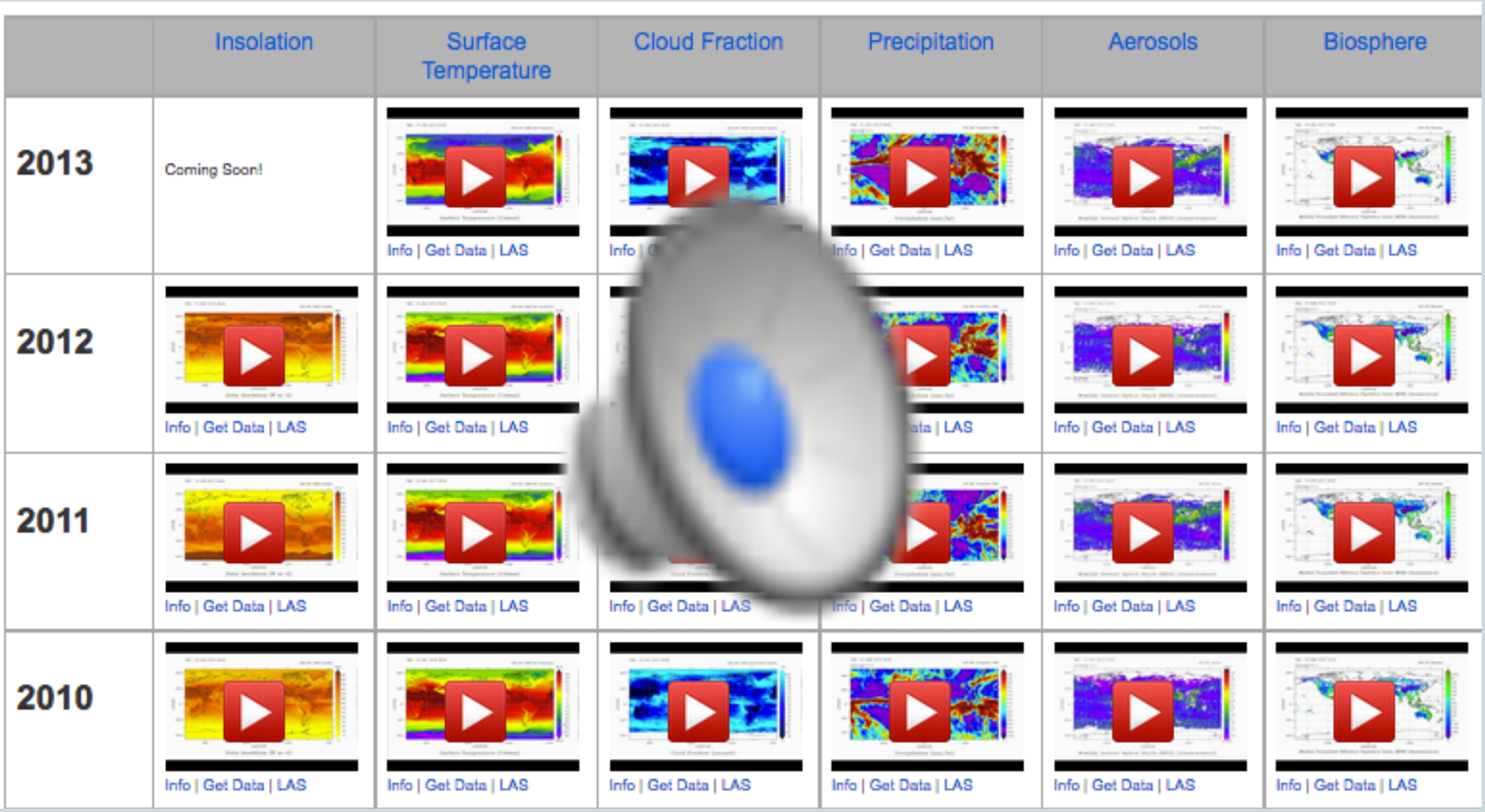
Slide Credit: Jessica Taylor and Dr. Todd Ellis, CALIPSO Science team Meeting 2016

MY NASA DATA: Data Visualization



https://mynasadata.larc.nasa.gov/

MY NASA DATA/GLOBE
Earth System Science Poster



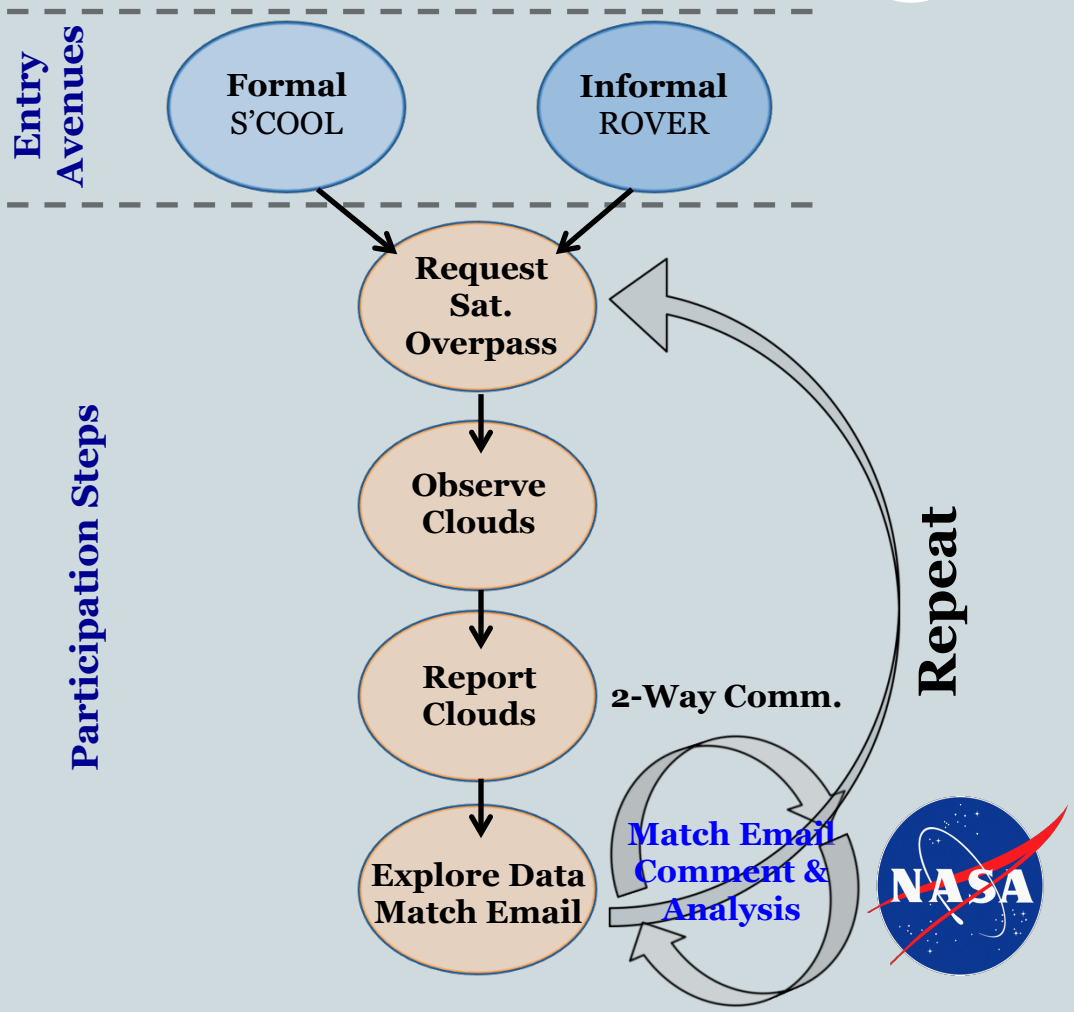
https://mynasadata.larc.nasa.gov/globe/

MY NASA DATA What's Next

Moving Forward…

- NESEC asset for multiple applications to get NSAS Earth Science into the hands of Educators and Students.
- Collaboration with Intel ISEF and the Creation of the NASA Earth System Science Award Criteria
- Mission Earth partnership, vertically integrating NASA assets and resources across grade band and developing an effective educator professional development model.

The S'COOL Project: Cloud Ground Observation



Reaching Participants Worldwide

236,480
participants

132,734
ground observations

73,746
satellite matches

75
countries

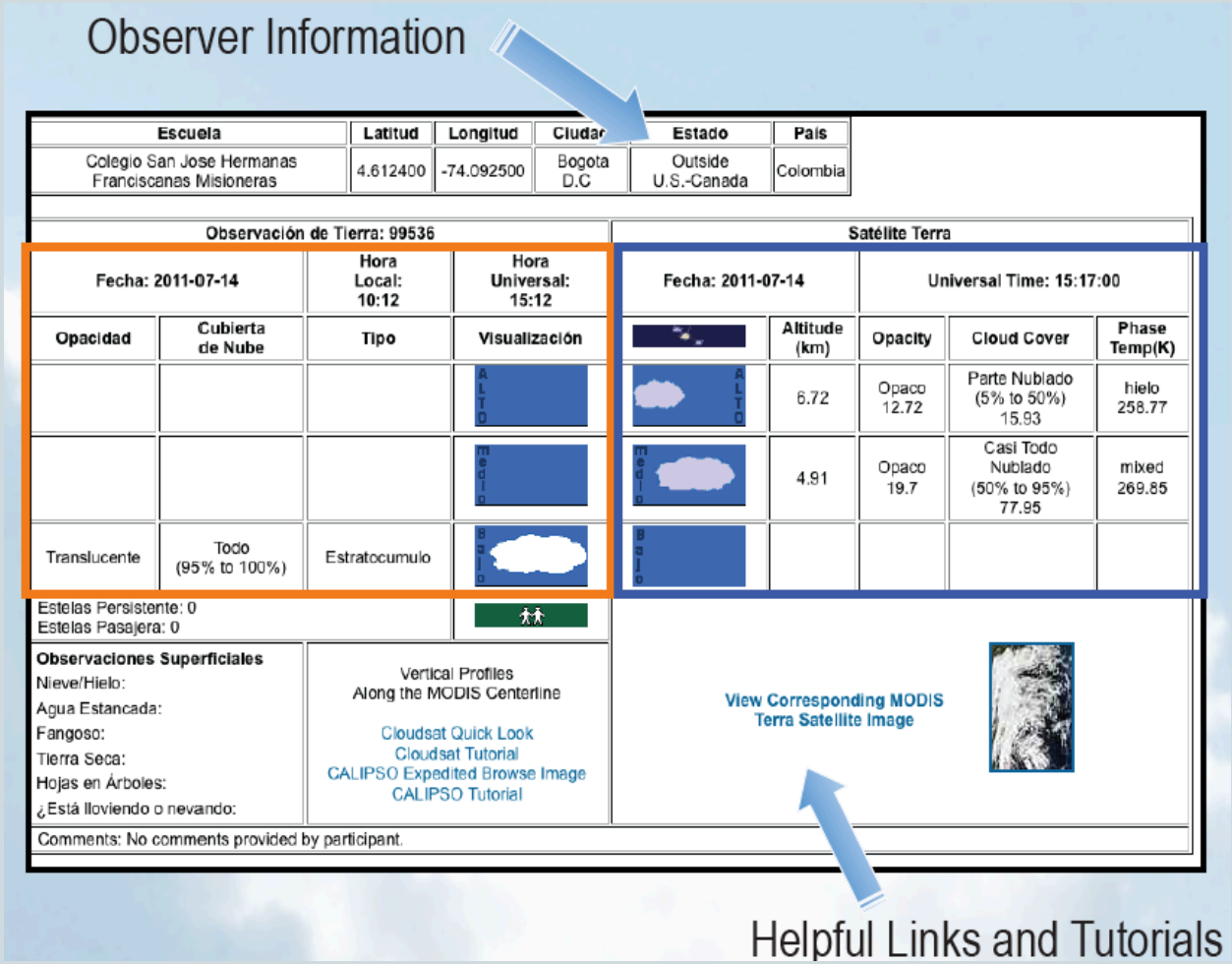
17
Years

All 7
continents

Scool@larc.nasa.gov

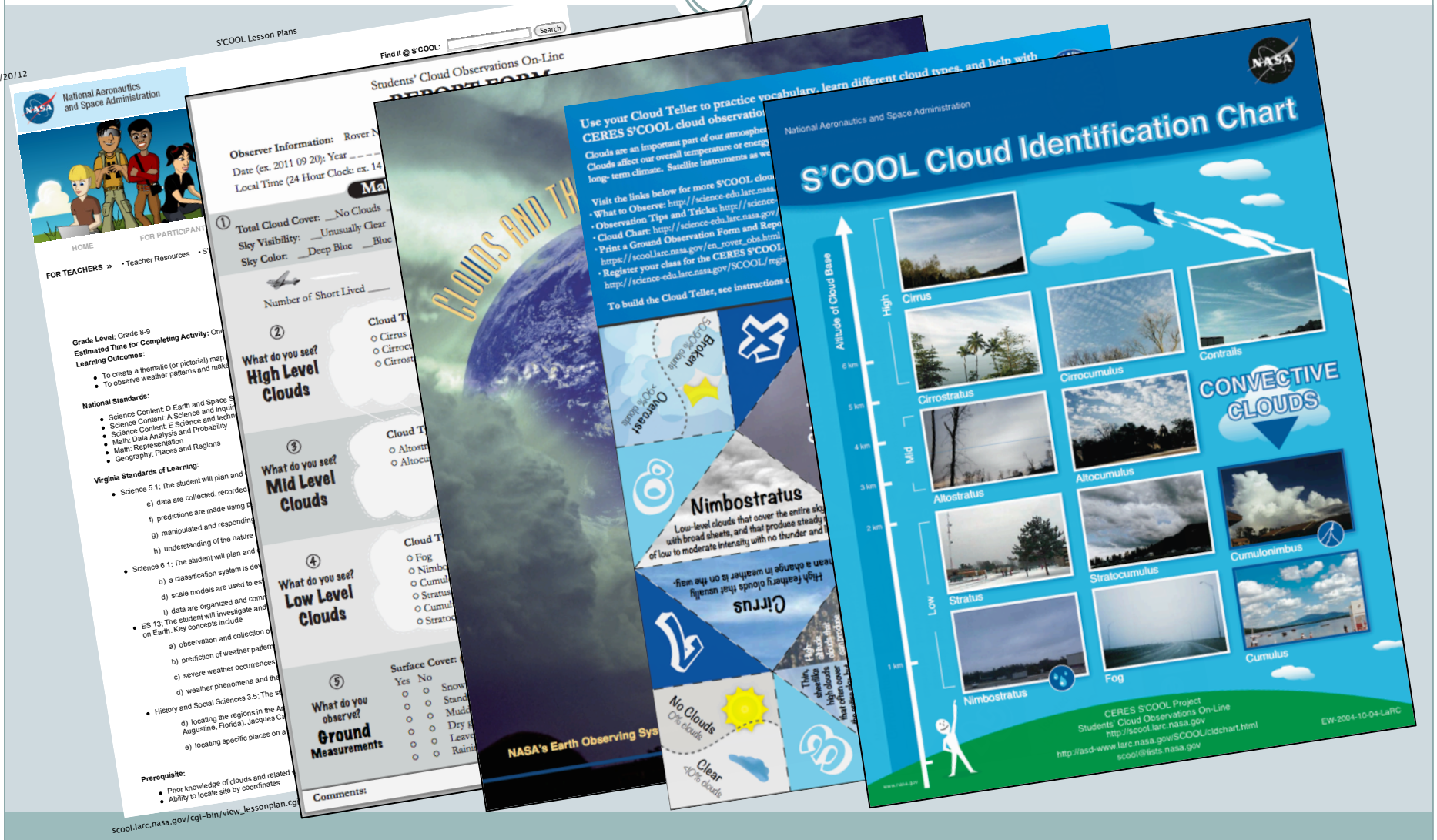
S'COOL: Satellite Matching and Comparison

Match/Comparison Email
Observers will receive a 'Match' email when their observations have fallen within the selected overpass time period. The ground observation will be on the left and the satellite observation and images will be on the right.



S'COOL Resources

Scool@larc.nasa.gov

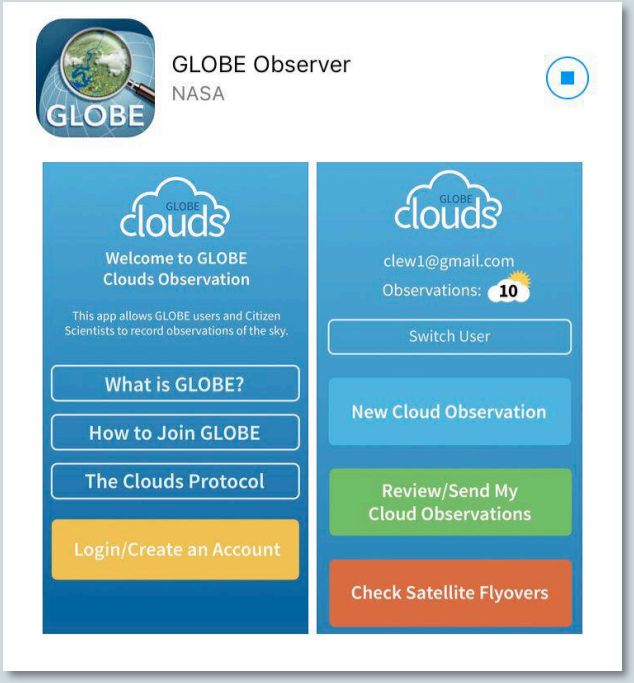


Students' Cloud Observations On-Line (S'COOL) What's Next

Moving Forward…

- S'COOL integration into the GLOBE Program
  - Formal application: Updated Cloud Observation Protocol, NEW hard copy materials, training slides, online data input, communication to internal and external GLOBE community, training opportunities around NEW cloud protocol
  - Informal application: Clouds is the first protocol translated to the GLOBE Observer APP, designed to extend GLOBES audience and participation

- Mission Earth partnership, vertically integrating NASA assets and resources across grade band and developing an effective educator professional development model.



The GLOBE Program: www.globe.gov








Science Protocols

Learning Activates

Data Collection

Data Visualization

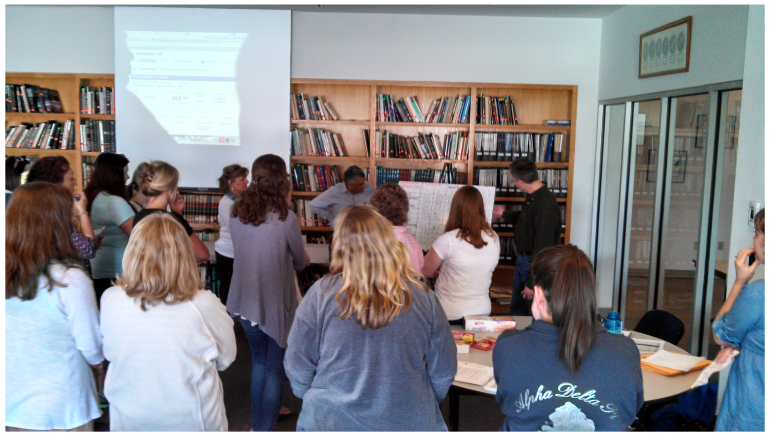
Mobile Application

Virtual Science Fairs

Campaigns

http://www.globe.gov/web/guest/home

CERES, Engaging Educators, Students and Public Learners for the past 20 years



You can Observer

You can Analyze

You can Be A Scientist

The Value of Science

There is Value in Engaging Citizen Scientists to Enhance Science Understanding!

What is Citizen Science?

Level 4 'Extreme'	• Collaborative Science – problem definition, data collection and analysis
Level 3 'Participatory science'	• Participation in problem definition and data collection
Level 2 'Distributed Intelligence'	• Citizens as basic interpreters
Level 1 'Crowdsourcing'	• Citizens as sensors

Sui, D.Z., Elwood, S. and M.F. Goodchild (eds.), 2013. Crowdsourcing Geographic Knowledge. Berlin: Springer.

CERES, Engaging Educators, Students and Public Learners for the past 20 years

- Research shows that students benefit greatly from being involved in scientific inquiry, because they model the actual scientific process and they are more engaged in the learning environment.
- Students learn how to collect data, interpret data, analyze data, think about the data and what might have affected the data, and present their data

Slide Credit: Jessica Taylor and Dr. Todd Ellis, CALIPSO Science team Meeting 2016

Citizen Science Channels: Globe Observer

Facebook Live App Kick Off

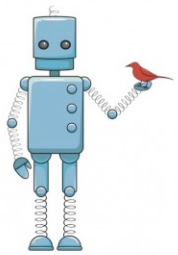
Data Visualization

http://observer.globe.gov/news-events/news/-/blogs/19643529/maximized

Citizen Science Channels

NSTA
National Science Teachers Association

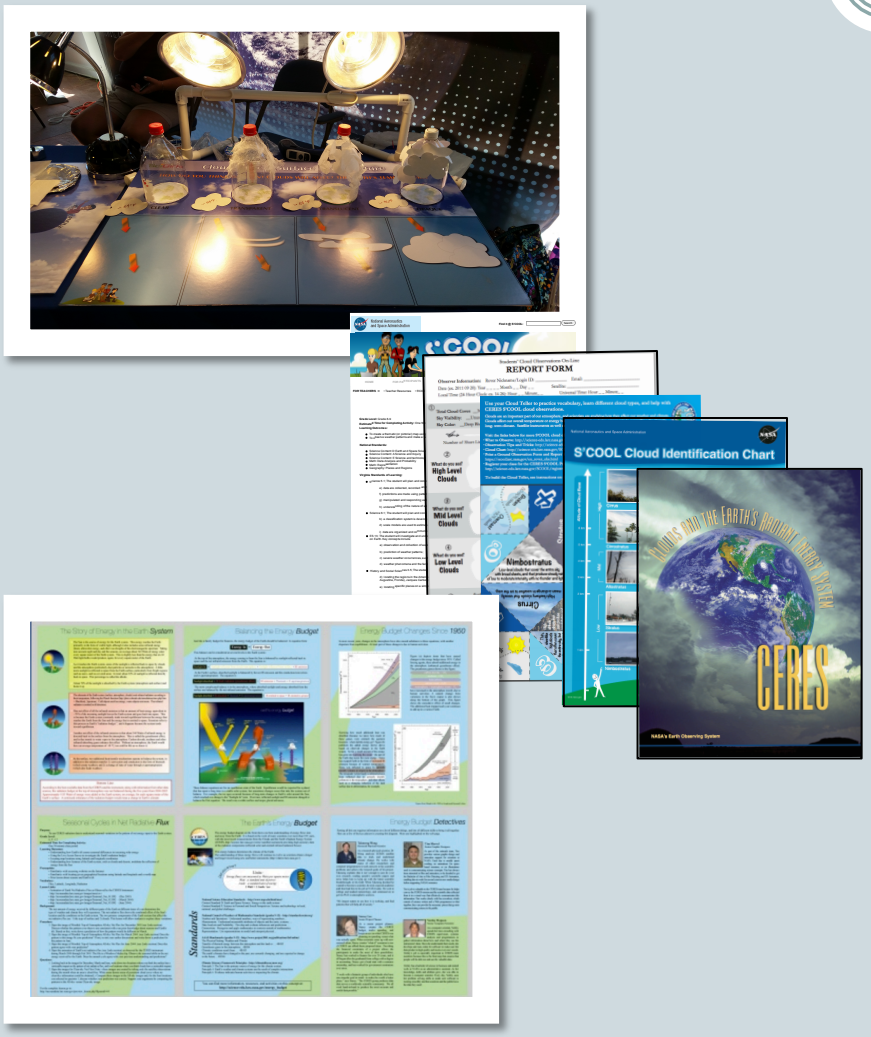
CITIZEN SCIENCE.ORG


scistarter
People-powered science.

POLAR CRUISES

ZOONIVERSE

Resources



- Contact the NASA SD Education Team for:
  - Hardcopy Handouts
  - Activity Kits
  - Table Demonstrations
  - Presentation Content
  - Web resources

How You Can Connect!

Why is observing, studying, and monitoring clouds important?

How You Can Share Your Science Story!

- Collaborate with the SD Education Team throughout the year
  - GLOBE Integration Home Page Videos
  - GLOBE International Scientist/STEM Network: http://www.globe.gov/join/become-a-globe-scientist
  - Professional Development, Science Material Experts, Guest Speakers
  - Research assistance, utilize citizen science community to provide otherwise inaccessible data.
  - Etc…

Thank YOU!

We are here to help support your efforts!
sdepo@lists.nasa.gov

Sarah McCrea
Sarah.mccrea@nasa.gov

CERES, Engaging Educators, Students and Public Learners for the past 20 years

If you don't collect a data point now, you will never be able to collect it again

Collaborating Satellite Missions

https://www.youtube.com/watch?v=bWnlpRPbaSc